(12) DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITÉ DE COOPÉRATION EN MATIÈRE DE BREVETS (PCT)

(19) Organisation Mondiale de la Propriété Intellectuelle
Bureau international

(43) Date de la publication internationale
22 janvier 2004 (22.01.2004)

PCT

(10) Numéro de publication internationale
WO 2004/007320 A1

(51) Classification internationale des brevets[7] : B65G 17/08

(21) Numéro de la demande internationale :
PCT/FR2003/002060

(22) Date de dépôt international : 2 juillet 2003 (02.07.2003)

(25) Langue de dépôt : français

(26) Langue de publication : français

(30) Données relatives à la priorité :
02/08468 5 juillet 2002 (05.07.2002) FR

(71) Déposant *(pour tous les États désignés sauf US)* : GEBO INDUSTRIES (SOCIETE ANONYME) [FR/FR]; Z.I. - Rue du Commerce, F-67116 Reichstett (FR).

(72) Inventeur; et

(75) Inventeur/Déposant *(pour US seulement)* : PETROVIC, Zmaj [FR/FR]; 19, rue des Chasseurs, F-67450 Mundolsheim (FR).

(74) Mandataire : RHEIN, Alain; Cabinet Bleger-Rhein, 8, avenue Pierre Mendès France, F-67300 Schiltigheim (FR).

(81) États désignés *(national)* : AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

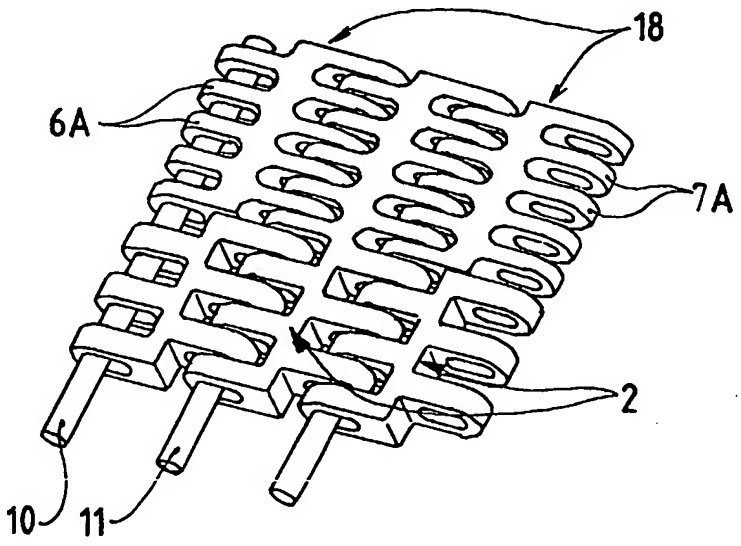
(84) États désignés *(régional)* : brevet ARIPO (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), brevet eurasien (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), brevet européen (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), brevet OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Publiée :
— *avec rapport de recherche internationale*

[Suite sur la page suivante]

(54) Title: CONVEYOR BELT

(54) Titre : TAPIS DE CONVOYAGE



(57) Abstract: The invention concerns a planar conveyor belt designed to move along curved trajectories and consisting of a plurality of chain-links (2) including, staggered at the front (3) and at the rear (4) of a central core (5), a succession of slots (6, 7) including each an opening (8, 9), in particular oblong in shape, so as to ensure play in a longitudinal direction of a chain-link (2) relative to another adjacent chain-link. Said conveyor belt is characterized in that at least on the side (14) external to the curved trajectory it is designed to follow, at least some of the chain-links (2) comprise, in their transverse extension, a chain-link module (18) providing, in particular across its slots (6A, 7A) a curvilinear contact zone with the pivot pins linking them.

(57) Abrégé : L'invention a trait à un tapis de convoyage plan prévu apte à emprunter des trajectoires courbes et composé d'une pluralité de maillons (2) comportant, disposée en quinconce à l'avant (3) et à l'arrière (4) d'une âme centrale (5), une succession de créneaux (6, 7) comportant, chacun, une ouverture (8, 9), notamment de forme oblongue, de manière à assurer un jeu dans une direction longitudinale d'un maillon (2) par rapport à un autre adjacent. Ce tapis de convoyage est caractérisé par le fait qu'au moins due côté externe (14) à la trajectoire courbe qu'il est destiné à emprunter, au moins certains des maillons (2) comportent, dans leur prolongement transversal, un module de maillon (18) offrant, notamment au travers de ses créneaux (6A, 7A) une zone de contact curviligne avec les axes d'articulation qui les lient.

WO 2004/007320 A1

CONVEYOR BELT

RELATED U.S. APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

REFERENCE TO MICROFICHE APPENDIX

Not applicable.

FIELD OF THE INVENTION

[0001] The invention relates to a planar conveyor belt designed to move along curved trajectories and consisting of a plurality of chain-links including, staggered, at the front and at the rear of a central core, a succession of slots including each an opening for the passage of a transverse pivot pin ensuring the connection between two successive chain-links, at least the openings of the slots at the front or those at the rear being oblong in shape so as to ensure a backlash in a longitudinal direction of a chain-link with respect to another adjacent chain-link.

[0002] This invention concerns the field of conveyance of objects of all kinds, for example of containers or similar.

BACKGROUND OF THE INVENTION

[0003] In this connection, in the field of conveyance of containers such as bottles, the conveyors that are most frequently used to ensure their transport through a bottling unit include pallet chains

describing closed circuits and on the upper side of which rests, as a matter of fact, the bottom of these bottles.

[0004] Several of these pallet chains can be juxtaposed so as to constitute a conveyance plane.

[0005] Obviously, the small width of the pallets constituting these chains permits them to move along curved trajectories. This type of pallet chain, usually made out of stainless steel, is of a particularly high cost price, taking into account, besides, that their driving should often be individualized.

[0006] Furthermore, the speed differential between a chain inside the curve and that situated outside it leads to a relative movement of the containers with respect to each other during their transport from a processing unit in the direction of another. This is not always desirable, in particular when less stable containers have to be conveyed.

[0007] Therefore, there have been devised conveyor belts that are able to move, in a horizontal plane, along curved trajectories yet being constituted of chain-links hinged one with respect to the other extending over the entire width of a conveyor.

[0008] More particularly, such a chain-link includes, at the front and at the rear of a central core and staggered, a succession of slots crossed by an opening for the passage of a pivot pin ensuring the connection of two successive chain-links.

[0009] At least the openings of the slots at the front or those at the rear are oblong in shape in order to provide these chain-links with longitudinal mobility one with respect to the other. This permits these chain-links to be brought closer to each other on the inner side of a bend of the conveyor belt.

[0010] Under such circumstances, one understands, by the way, that, though on the straight portions of this belt, the traction that is imparted to it by the appropriate driving means is exerted from one

chain-link on the other over their length, in the curved portions this traction force can only be reflected from one chain-link to the following through their slots situated outside the bend.

[0011] Obviously, the fact that this traction force is concentrated at the outer edge of the conveyor belt in order to, so to speak, be transferred from one chain-link to another through a single one of their slots, makes this belt particularly fragile. All in all, the width of such a conveyor belt is necessarily limited. Besides, it cannot have a bend of more than 90°.

[0012] In order to improve the situation, several solutions have been contemplated. The first one consisted in attaching to the ends of each chain-link a reinforced module. In particular, though the chain-links are usually made of plastic, the reinforcement modules completing them at their ends are made of metal. Actually, this solution does not completely solve the problem brought up and the increase of the belt weight through these additional metal modules, which are in addition expensive, makes it unsatisfactory.

[0013] Within the framework of WO-98/06648 it has also been conceived to confer to the pivot pin linking two successive chain-links a conical shape at its end portions. Here again, no solution has been provided for the problem brought up, since this conicity, corresponding necessarily to fixed data, can only suit a well-defined curve radius, for example, the maximum curve radius the belt can adopt.

[0014] It is therefore obvious that for smaller curve radiuses, the retransmission of the traction force occurs from one chain-link onto the other one, at a precise point on their length transverse to the axis of the belt.

[0015] All in all, this retransmission of the traction force is carried out in a localized way by means of one, even two, of the slots of these chain-links.

BRIEF SUMMARY OF THE INVENTION

[0016] Within the framework of a first inventive step, the problem has been raised again and in this context it has been found that, in 90 % of the conveying installations, such as bottling units, the conveyor belt only moves along curved trajectories in one single direction, be it left or right, with respect to the direction of progression of this belt.

[0017] Thus, for these 90% of the installations it has been supposed that it could be advantageous to find a solution permitting to solve the problem by improving the distribution of stresses, as much as possible, on one and/or the other side of the conveyor belt, i.e. the side situated externally with respect to the planned trajectory of this belt.

[0018] It should be noted, however, that the reinforcement according to the invention can be made on each lateral side of the belt, i.e. at each one of the ends of the chain links it is comprised of.

[0019] In a second inventive step, it has been conceived that, in particular on the outer side of a curved trajectory, the conveyor belt will be adapted to such a trajectory, not through relative mobility of the chain-links with respect to each other, but thanks to a modularity of each one of these chain-links.

[0020] All in all, though the chain-links are usually mobile with respect to each other thanks to the oblong openings made in their slots crossed by a pivot pin, it has been conceived to rather adapt the width of these chain-links, in particular, in their external portion of the curvature, to the radius of the latter.

[0021] To this end, the invention relates to a planar conveyor belt designed to move along curved trajectories and consisting of a plurality of chain-links including, staggered, at the front and at the rear of a central core, a succession of slots including each an opening for the passage of a transverse pivot

pin ensuring the connection between two successive chain-links, at least the openings of the slots at the front or those at the rear being oblong in shape so as to ensure a backlash in a longitudinal direction of a chain-link with respect to another adjacent chain-link, characterized in that at least on the side external to the curved trajectory the conveyor belt is designed to follow, at least some of the chain-links include, in their transverse extension, a chain-link module including, staggered at the front and at the rear of a central core, slots provided with an oblong opening which ends, at least on the external most distant side with respect to the median plane of the chain-link module, in a semicircular sector the center of which is located on an axis that is convex in shape of a considerable curve radius, exceeding one meter, seen with respect to said median plane.

[0022] Within the framework of the same inventive idea, the invention also relates to a planar conveyor belt designed to move along curved trajectories and consisting of a plurality of chain-links including, staggered, at the front and at the end of a central core, a succession of slots including each an opening for the passage of a transverse pivot pin ensuring the connection between two successive chain-links, at least the openings of the slots at the front or those at the rear being oblong in shape so as to ensure a backlash in a longitudinal direction of a chain-link with respect to another adjacent chain-link, characterized in that at least on the side external to the curved trajectory the conveyor belt is designed to follow, at least some of the chain-links include, in their transverse extension, a chain-link module consisting of at least two intermediate chain-links including, staggered at the front and at the rear of a central core, slots, those at the front, respectively at the rear of the front, respectively rear, intermediate chain-link, being provided with an opening adapted to the cylindrical cross-section of the pivot pin crossing them, whereas the slots at the rear, respectively at the front, of the front, respectively rear, intermediate chain-link, being provided with an oblong opening which ends at least

on the external most distant side with respect to the median plane of the corresponding intermediate chain-link, in a semicircular sector the center of which is located on an axis that is convex in shape of a considerable curve radius, exceeding one meter, seen with respect to said median plane, these oblong openings being crossed by an intermediate pivot pin section.

[0023] Also in the same inventive idea, the invention further relates to a planar conveyor belt designed to move along curved trajectories and consisting of a plurality of chain-links including, staggered, at the front and at the rear of a central core, a succession of slots including each an opening for the passage of a transverse pivot pin ensuring the connection between two successive chain-links, at least the openings of the slots at the front or those at the rear being oblong in shape so as to ensure a backlash in a longitudinal direction of a chain-link with respect to another adjacent chain-link, characterized in that at least on the side external to the curved trajectory the conveyor belt is designed to follow, at least some of the chain-links include, in their transverse extension, a chain-link module including, staggered at the front and at the rear of a central core, slots provided with an opening adapted to the cylindrical cross-section of the pivot pin crossing them, the core of these chain-link modules being defined by two juxtaposed bars of which the front bar carries the rear slots and the rear bar carries the front slots, these bars adopting a symmetric arrangement with respect to the transverse median plane of a chain-link and being convex in shape facing each other with a considerable curve radius, exceeding one meter.

[0024] It results from the design according to the invention that at least on the external portion of a curved trajectory followed by the conveyor belt, the retransmission of the traction force is exerted from one chain-link on the other through chain-link modules extending them outside a bend, which

modules include several slots in perfect engagement with the pivot pins, and even an intermediate pivot pin section.

[0025] All in all, the design of these end chain-link modules and the curvilinear contact surface they provide in each one of their embodiments, permits a retransmission of this traction force from one chain-link onto the other one taking into consideration several of their front and rear slots and not a single one as it was the case in previously known situations.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0026] This invention will be better understood when reading the following description as well as the attached drawings referring to one embodiment.

[0027] Figure 1 schematically shows a top view of a portion of a conveyor belt according to the invention.

[0028] Figure 2 is a schematic, partial and plan view of a conveyor belt.

[0029] Figure 3 schematically shows, in perspective and partially, chain-links of a conveyor belt which end in a chain-link module according to the invention, according to a first embodiment.

[0030] Figure 4 is a schematic, plan and cross-sectional view of a chain-link module corresponding to the embodiment of Figure 3.

[0031] Figure 5 is an elevational view of the chain-link module of Figure 4.

[0032] Figure 6 schematically shows, in perspective and partially, chain-links of a conveyor belt which end in a chain-link module according to the invention, according to a second embodiment.

[0033] Figure 7 is a schematic, plan and sectional view of a chain-link module corresponding to the embodiment of Figure 6.

[0034] Figure 8 is an elevational view of the chain-link module of Figure 7.

[0035] Figure 9 schematically shows, in perspective and partially, chain-links of a conveyor belt which end in a chain-link module according to the invention, according to a third embodiment.

[0036] Figure 10 is a schematic view of a chain-link module, corresponding to the embodiment of Figure 9, in the stage of assembling of the two basic portions it is comprised of.

[0037] Figure 11 is a schematic top view of the chain-link module shown in Figure 10.

[0038] Figure 12 is a perspective bottom view of the chain-link module of Figure 10.

DETAILED DESCRIPTION OF THE INVENTION

[0039] As schematically shown in Figure 1, this invention refers to a planar conveyor belt 1 designed to move along curved trajectories by distortion in a horizontal plan.

[0040] As shown in Figure 2, this belt 1 consists of a plurality of chain-links 2 hinged one with respect to the other, each one of these chain-links 2 including, staggered at the front 3 and at the rear 4 of a central core 5, a succession of slots 6, 7 including each an opening 8, 9 for the passage of a transverse pivot pin 10, 11 ensuring the connection between two successive chain-links 2. The openings 8, 9 of the slots 6 in the front portion 3 and/or of the slots 7 in the rear portion 4 are oblong in shape in a direction perpendicular to the median plane 12 of a chain-link 2 so as to ensure a backlash of a chain-link 2 with respect to another adjacent chain-link, longitudinally with respect to the belt 1.

[0041] Taking into consideration that on a conveyance line traction forces are exerted on the belt 1 as represented by the arrows 13 shown in Figure 1, or, in a bend, on the outside 14 of the latter, it has been conceived to reinforce at least the corresponding lateral side 15 of this conveyor belt 1.

[0042] As a matter of fact, since on 90% of the conveyance lines, only bends in one single direction, either right or left, are followed by a belt 1, it might be useless to reinforce the latter on each one of its lateral sides 15.

[0043] Finally, this reinforcement consists in attaching, in the transverse extension of at least several of these chain-links 2, therefore at one and/or the other end 17 of the latter, a reinforcing chain-link module 18, represented in various embodiments in Figures 3 through 12.

[0044] These chain-link modules 18 can be independent or be an integral part of the chain-links 2. They also include, at the front 3A and at the rear 4A, staggered, slots 6A, 7 A, the number of which can be varying and that are crossed by openings 8A, 9 A for the passage of the pivot pins 10, 11.

[0045] In this connection and according to a first embodiment shown in Figures 3, 4 and 5, said openings 8A, 9A are oblong in shape and end at least on the external most distant side 30, 31 with respect to the median plane 32 of the chain-link module 18, in a semicircular sector 33 the center 34 of which is located on an axis 35, 36 convex in shape of a considerable curve radius, exceeding one meter, seen with respect to said median plane 32.

[0046] According to a second embodiment shown in Figures 6, 7 and 8, a chain-link module 18 consists of at least two intermediate chain-links 40 ; 41 including, staggered at the front and at the rear of a central core 42 ; 43, slots 44, 45 ; 46, 47. Those at the front 44, respectively at the rear 47, of the front 40, respectively rear 41 intermediate chain-link, are provided with an opening 8A, 9A adapted to the cylindrical section of the pivot pin 10, 11 crossing them. Whereas the slots at the rear 45, respectively at the front 46, of the front 40, respectively rear 41 intermediate chain-link, are provided with an oblong opening 48 ; 49 which ends at least on the external most distant side 50 ; 51 with respect to the median plane 52 ; 53 of the corresponding intermediate chain-link 40; 41, in a

semicircular sector 54; 55 the center 56; 57 of which is located on an axis 58 ; 59 convex in shape of a considerable curve radius, exceeding one meter, seen with respect to said median plane, respectively 52 ; 53. These oblong openings are crossed by an intermediate pivot pin section 60.

[0047] Finally, according to a third embodiment, said openings 8A, 9A of the front 6A and rear 7 A slots of the chain-link module 18 are, in this case, adapted to the cross-section of the pins 10, 11 linking the chain-links 2. All in all, these slots 6A, 7A are mounted exclusively pivoting on these pins. Besides and according to the invention, this chain-link module 18 includes a central core 5A defined by two juxtaposed bars 19, 20, the front bar 19 of which carries the rear slots 7 A, the rear bar 20 carrying the front slots 6A.

[0048] All in all, this chain-link module 18 consists of two basic portions 21, 22 designed to be fitted into each other according to the conditions shown in Figure 10.

[0049] More particularly, the front slots 6A are inserted from the bottom between the rear slots 7 A in order to be pushed into the front portion 3A so that the bar 20 carrying these front slots 6A is juxtaposed at the rear of the bar 19 carrying the rear slots 7 A.

[0050] The length of the slots 6A, 7 A is so defined as to give to the basic portions 21, 22, of a chain-link module 18 a relative mobility in a direction perpendicular to its longitudinal median plane, i.e. in the longitudinal direction of the conveyor belt 1.

[0051] Besides, these bars 19, 20 are designed, facing each other, convex in shape of a considerable curve radius, exceeding one meter, preferably in the order of three meters. Thus, as shown in Figure 11, once the two basic portions 21, 22 are moved apart from each other to the maximum, corresponding to a situation of curved trajectory followed by the conveyor belt 1, the bars 19, 20 lean on each other by their side convex in shape according to a zone extending on a length corresponding

to several of their slots 6A, 7 A in order to favor the distribution of the traction load exerted on said conveyor belt 1.

[0052] This results, on the one hand, from the size of the curve radius on their convex side and, on the other hand, from their elastic distortion under the action of this traction force exerted on the conveyor belt 1.

[0053] Actually, it is the same principle that has been applied in each of the embodiments described above, since each time one has sought a curvilinear contact zone extending over several slots, when the belt follows a curved trajectory.

[0054] It should be noted, in this connection, that this improved distribution of the traction load on a chain-link permits to manufacture these reinforcement chain-link modules 18 out of synthetic material, just like the chain-links 2 themselves.

[0055] All in all, this invention permits to advantageously solve the problem brought up, since the gain obtained is not simply limited to an increased mechanical strength of the conveyor belt 1. As a matter of fact, the latter can, finally, follow without any problem curvatures exceeding 90°, curvatures that required, until now, the use of two separate conveyor belts with separate driving means for each of them.

[0056] It should be noted once again that the chain-link modules are not necessarily provided on each chain-link of the belt, that they can have different lengths, in particular in order to create a nesting preventing them from escaping from the major chain-links in particular when they are not an integral part of the latter.